REMARKS

Claims 1-4, 8, 11, 20, 22, 27, 28 and 31-34 are pending.

Referring to pages 3-7 of the Office Action, claims 1-4, 8, 11, 20, 22, 27-28 and 31-34 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,218,306 ("Gross") in view of U.S. Patent No. 6,416,656 ("Zhang").

Applicants traverse and respectfully request the Examiner to reconsider and withdraw the rejection. Gross in combination with Zhang does not disclose or render obvious the presently claimed FCC process.

(a) The Examiner takes the position that Table 2 of Gross teaches the claimed process of producing LPG, referring in particular to the total C4's and total C3's by volume. (*See* Advisory Action dated September 29, 2008 at continuation sheet.)

Applicants respectfully disagree.

Table 2 of Gross simply shows that it is possible to increase LPG production in a specific example where there is an injection of about 4% of secondary feed at 18 feet above the primary feed. However, Gross is silent with respect to the actual effect on LPG yields corresponding to the secondary feed injection height and volume thereof that is injected.

The reduction of gasoline yields shown in Figures I and III of Gross might be interpreted as gasoline overcracking. However, one of ordinary skill in the art would understand that coke and gas could be produced by gasoline overcracking, besides LPG.

Further, Gross expressly discloses that Table 2 teaches that the yield pattern varies significantly with the type of feed used for the secondary injection feed. (*See* Gross at 6:33-35.) In addition, Table 2 demonstrates that light gas (C2–) production is higher for certain feeds. (*See* Gross at 7:19-21).

For *at least* the reasons set forth above, Table 2 of Gross fails to even suggest the claimed process of producing LPG.

(b) The Examiner also asserts that Gross does not limit the riser location to 10 to about 30 feet. (*See* Gross at 2:62-68.) Even if this were true, for *at least* the following reasons Gross does not teach or suggest the presently claimed FCC process for producing light products, such as LPG, wherein the injection of the secondary feed can be placed at one or more riser locations between the broad range of between 10% and 80%. In contrast, one of ordinary skill in the art in possession of the teachings of Gross (and including the claims of Gross) would have believed that a lower injection point and a longer residence contact time is actually preferred.

For example, Gross teaches that the ideal injection point depends on a variety of aspects, such as: ". . . the quantity of the feed charged, the composition of the feed charged, the coke burning restraint of an associated catalyst regenerator and the processing conditions relied upon." (*See* Gross at 2:62-68.) In addition, the riser location level of the secondary feed was recited in claims 1 and 8 of Gross. In order to produce high yields of gasoline, Gross set the injection point of the secondary feed at 10 to about 30 feet above the bottom of the riser fresh feed inlet (similarly, claim 8 of Gross recites an injection point of from 10 to about 25 feet). These heights correspond to about 6 to 30% of the riser reactive section, based on the usual FCC riser height of 110 feet.

Gross also teaches that to obtain a desired conversion it is normally necessary to use a ***longer residence contact time*** in the remaining downstream portion of the riser. (*See* Gross at 4:55-60).

In contrast to the teachings of Gross, unexpectedly superior results were obtained by the presently claimed FCC process by employing improved conditions of atomization of the

secondary feed that enlarge the conversion section to up to 80% of the FCC riser reactive zone for cracking the feed. In particular, the recited combination of the injection of the secondary feed at a higher location of the riser ***together with*** the injection of dispersion steam decrease the residence contact time of the feed stream in the remaining downstream portion of the riser. Despite the teaching of Gross, the present application demonstrates that the recited process increases the gasoline overcracking to LPG.

For *at least* the reasons set forth above, one of ordinary skill in the art in possession of the teachings of Gross in combination of Zhang would have had no reason to increase LPG production by decreasing residence time of the secondary feed and, likewise, would not have predicted the flexibility of the resulting large conversion section up to 80% of the FCC riser reactive zone.

(c) The Examiner also takes the position that the present claims do not recite the location where the dispersion steam is injected into the riser. Further, the Examiner states that the "pre-lifting steam of Zhang is being used to reduce the residence time of the feed stream and to help in carrying the distillate oils upward in the riser reactor and at the meantime, increasing the dispersion of the feed stream."

Applicants respectfully disagree with the Examiner's position.

Claim 1 recites that the dispersion steam is injected with feed B, which is injected at a point downstream of the base of the riser at a point after maximum production of LPG from feed A, at one or more riser locations between 10% and 80% of the riser reactive section. In other words, claim 1 clearly recites "the location where the dispersion steam is being injected" because it is expressly claimed as being injected with feed B. Likewise, Examples 1 and 2 of the present

application both demonstrate that increasing the amount of dispersion steam in feed B yields an increase in LPG at the expense of gasoline.

Furthermore, the pre-lifting steam of Zhang is injected into the lower zone where the gasoline stock and catalyst are charged. (*See* Zhang at 5:20-25.) The pre-lifting medium such as the steam of Zhang is being used to reduce the residence time of the feed stream and to help in carrying the distillate oils upward in the riser reactor while also increasing the dispersion of the feed stream.

Applicants agree with the Examiner that steam is ordinarily used as a pre-lifting medium to reduce residence time in the riser. However, a maximum residence time is desired for gasoline overcracking to LPG (which is, of course, an object of present process).

Accordingly, from the general knowledge of one of ordinary skill in the art at the time of the invention, it would have been apparent that the downstream injection of dispersion steam with the secondary feed B in the FCC process according to the presently claimed invention would not result in the longer residence time typically required for gasoline overcracking to LPG (smaller molecular range hydrocarbons). Instead, according to the presently claimed invention, a downstream injection of the dispersion steam with the secondary feed were utilized to improve the high dispersion degree for the secondary feed B in the reactor. Unpredictably, the conversion to light products was increased and the injection point(s) for the secondary feed was flexibly increased to up to 80% of the FCC riser reactive zone.

In light of the above, nothing within the disclosure of Gross in combination with Zhang provides one of ordinary skill in the art with any reason for injecting the secondary feed downstream with dispersion steam. Indeed, the patentability of the presently claimed invention is further supported by the fact that one of ordinary skill in the art in possession of the teachings

of Gross in combination of Zhang would have reduced the residence time by using a pre-lifting medium at the base of the riser.

(d) Applicants also point out to the Examiner that Gross discloses that charging the less desirable and generally higher coke producing hydrocarbon material (i.e., secondary feed) downstream in the riser conversion zone with little or no preheat may be used to lower the temperature of the feed-catalyst suspension. (*See* Gross at 3:68 to 4:3.) One of ordinary skill would understand that this section of Gross is discussing "quenching" in FCC technology. The quenching effect of the secondary feed would require more combustion air be sent to the regenerator, since coke production would increase as CTO (i.e., catalyst/oil ratio) also increases.

In contrast to the teaching of Gross, Tables 3A and 3B (case 7) set forth in the present application demonstrate that a higher temperature of the secondary feed increases conversion into LPG. Thus, the injection of secondary feed in the presently claimed invention is not directed to promoting quenching. Upon process conditions LPG production would increase without increasing CTO. The use of a secondary feed as a quenching stream would require more combustion air be sent to the regenerator, since the coke production would increase as CTO increases. Normally air constraints would limit the use of quenching.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the Section 103 rejection of the present claims based on Gross in combination with Zhang.

(d) Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the local, Washington, D.C., telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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